Nature commodification: ‘a necessary evil’? An analysis of the views of environmental professionals on ecosystem services-based approaches

Martin-Ortega, Julia; Mesa-Jurado, M Azahara; Pineda-Vazquez, Mariana; Novo, P

Published in:
Ecosystem Services

DOI:
10.1016/j.ecoser.2019.100926

Print publication: 01/06/2019

Document Version
Peer reviewed version

Nature commodification: 'a necessary evil'?
An analysis of the views of environmental professionals on ecosystem services-based approaches

Julia Martin-Ortega[a], M. Azahara Mesa-Jurado[b*], Mariana Pineda-Vazquez[b], Paula Novo[c]

[a]Sustainability Research Institute, University of Leeds, Leeds, United Kingdom
[b]El Colegio de la Frontera Sur, Unidad Villahermosa, Tabasco, Mexico
[c]Land Economy, Environment and Society Group, Scotland's Rural College, Edinburgh, United Kingdom
**corresponding author:* azaecosur@gmail.com

Abstract

Ecosystem services (ES) has established itself as the predominant paradigm for framing environmental research and policy-making. Its rapid popularization is raising concerns about the possibility that it might lead to nature commodification. These concerns have been associated with a broader agenda for the neoliberalization of conservation, but research on this area remains mostly theoretical. This paper advances the debate with an empirical study on the views of environmental professionals. The views of those who shape interpretation, uptake and implementation environmental practice are of critical importance since they give the real mark on whether any fundamental change in the current direction of environmental governance is to be expected. Using Mexico as an exemplar case of a country in which ES have clearly entered the environmental discourse, provides a forewarning of what might happen more broadly. Results indicate that, while acknowledging risks of commodification, environmental professionals consider a greater risk 'missing out' on opportunities to internalize ES monetary values in an economic growth-oriented context. They see negative side-effects as 'necessary evils' to achieve conservation targets. Any substantial change in environmental governance is more likely to occur due to the disenchantment produced by the lack of impact in practice than of fears of commodification.

Keywords: conservation, market-based environmentalism, Mexico, neoliberalism, payments for ecosystem services, valuation

1. Introduction

Human-nature relationships have been of interest since ancient times and different conceptualisations of such relationships have emerged over time (Gómez-Baggethun et al., 2010; Raymond et al., 2013; Saarikoski et al., 2018). The term ecosystem services is one such conceptualisation coined in the 1960s primarily to raise awareness among policy-makers for biodiversity losses by emphasising the benefits that nature freely provides to society (Gómez-Baggethun et al., 2010). Literature on ecosystem services grew from the late 1990s (Costanza et al., 1997; Daily, 1997; De Groot et al., 2002), until it firmly entered the policy arena when the UN Secretary-General Kofi Annan called for a global assessment of the world's ecosystem services (Millennium Ecosystem Assessment report, (MEA, 2005)). Ecosystem services were then formally defined as the benefits that people obtain from ecosystems and were categorized into supporting, provisioning, regulating, or cultural services, which all directly or indirectly contribute to human wellbeing. From the common base of the MEA, a multitude of academic contributions and refined definitions and classifications have emerged (Martin-Ortega et al., 2015; Ojea et al., 2012), making it gain prominence as the paradigm for framing environmental research and policy-making (Martin-Ortega et al., 2015; Raymond et al., 2013).

Strongly linked to the overall conceptualization of ecosystem services is the issue of their valuation (Gómez-Baggethun et al., 2010). Mainstream environmental economics assumes that values and benefits derived from nature can ultimately be expressed as "change[s] in human wellbeing arising from the provision of [an environmental] good or service" (Bateman et al, 2002: 1), with rational human beings seeking to maximise their wellbeing according to their substitutable preferences (Pearce and Turner, 1990). Under this paradigm, rooted in neoclassical economics, values are expressed as welfare changes. These can be determined through formal valuation exercises that estimate relative values and people's willingness to exchange scarce means (usually money) to achieve an environmental change. Values of ecosystem services calculated in this way can then be internalized in environmental decision-making (Costanza et al., 2017, 1997).

The ecosystem services concept has arguably inspired novel avenues for environmental research, it has enhanced communication, debates, and cooperation between scientists from a diverse range of disciplines, as well as policy-makers, conservationists, and practitioners (Costanza et al., 2017; Martin-Ortega et al., 2015). Beyond the MEA, the global TEEB initiative (The Economics of Ecosystem Services and Biodiversity (Kumar, 2010)), and related national ecosystem assessments such as the UK NEA (Bateman et al., 2011), as well as its adoption by the Convention on Biological Conservation (Prip, 2018), are testimony of the concept's wide-ranging appeal. Another example is the worldwide popularisation of payments for ecosystem services (PES) schemes (Porras et al., 2008; Schomers and Matzdorf, 2013; Waylen and Martin-Ortega, 2018). PES, which have been defined and conceptualized in various ways (Martin-Ortega and Waylen, 2018; Wunder, 2015), provide economic incentives for land management practices that are supposed to enhance or secure the provision of ecosystem services. They are based on the Coasean postulate by which the social optimum may be attained via bargaining between those producing the service and those benefiting from it (Engel et al., 2008; Wunder, 2005).

Inevitably, this popularisation has also led to the emergence of new debates and criticisms. Even those who do not necessarily question this notion see large gaps between the conceptual architecture of ecosystem services-based approaches and its translation into policy practice (Nahlik et al., 2012). Others question the added value of the ecosystem services concept beyond cosmetic efforts such as re-labelling pre-existing environmental management approaches (Martin-Ortega et al., 2015; Waylen and Martin-Ortega, 2018). More critically, others point out at the risk of oversimplifying ecological, economic and political processes through the use of the ecosystem services notion (Norgaard, 2010). Ecological economists are critical of the neoclassical conceptualisation of environmental values and argue that some values are incommensurate and cannot be measured with a single measurement unit such as money (Martinez-Alier et al., 1998;

Schulz et al., 2017). Concerns have also been raised about ecosystem services reasoning converting nature into a tradable commodity (Brockington, 2011; Gómez-Baggethun and Ruiz-Pérez, 2011; Kosoy and Corbera, 2010), marginalizing and crowding-out non-anthropocentric (often non-Western/utilitarian) frameworks for nature conservation (Raymond et al., 2013).

The present paper is concerned with this later issue: the risk of nature commodification. So far, these debates have been vastly dominated by theoretical contributions. Of the few existing empirical studies, some have experimentally explored behavioural changes associated with the use of the notion of ecosystem services (Novo et al., 2018); others have applied document analysis to investigate commodification effects in environmental public policies (Mesa-Jurado et al., 2018) and others have used in-depth case study examination to explore institutional aspects of commodification (Osborne and Shapiro-Garza, 2018). In this paper we focus on the views of those involved in informing, designing and implementing environmental public policy, aiming to understand the extent to which they consider there is a risk of commodifying nature in the adoption of ecosystem services-based approaches. The views of environmental professionals are of critical interest since they shape interpretation, uptake and implementation of ecosystem services-based approaches in practice. This critically affects if and how these approaches are consolidated in the long-rung and the consequences that this might have for environmental management practice. The present study also goes beyond previous research on the views of environmental professionals in this area by expanding the focus beyond market-based instruments only (Martin-Ortega and Waylen, 2018; Sandbrook et al., 2013) and covering ecosystem services-based approaches more broadly.

We apply semi-structured interviews to a purposive sample of influential national level Mexican environmental professionals, academics and practitioners. Using Hahn et al. 's (2015) framework for the identification of degrees of commodification, we discuss the views of these professionals in the context of the academic debates. Mexico is used here as an exemplar case of a country in which the ecosystem services discourse has clearly permeated environmental public policy (Mesa-Jurado et al., 2018; Shapiro-Garza, 2013). Discussions of results are, though, of global relevance due to the widespread interest on and application of ecosystem services-based approaches, and the potentially radical way in which these may environmental management and conservation (Sandbrook et al., 2013).

The remainder of this paper is organized as follows. Section 2 summarizes the debates on ecosystem services-based approaches and the risk of commodification. Section 3 presents a brief overview of the historical and current use of ecosystem services-based approaches in Mexico's environmental public policy, highlighting its interest as a case study. Methods are described in section 4, followed by a results and discussion section (5). Conclusions are drawn in section 6.

2. Ecosystem services-based approaches and nature commodification

We refer to ecosystem services-based approaches as a purposively broader concept than just the notion of benefits that humans obtain from nature. As in Martin-Ortega et al. (2015), we refer to a particular way of understanding the relationships between humans and the environment, which relies on the notion of ecosystem services but that can take different forms and have different purposes. Ecosystem services-based approaches therefore encompass conceptual frameworks such as the ecosystem services cascade (Haines-Young and Postchin, 2010), frameworks of actions (e.g. the Ecosystem Approach (Waylen et al. 2014)), ecosystems assessments (e.g. the UK NEA or TEEB (Bateman et al., 2011; Kumar, 2010)) and individual valuation exercises, as well as instruments for environmental governance such as PES. The underlying core element that underpins any of these is an anthropocentric and instrumental conceptualization of human-nature relationships, based indeed on the central idea that nature produces services that are beneficial to humans, with the purpose of guiding environmental decision-making (Martin-Ortega et al., 2015).

While initially the notion of ecosystem services was introduced to ensure that the value of nature was not ignored in environmental decisions (Costanza et al., 1997; Gómez-Baggethun et al., 2010; Peterson et al., 2010), there is growing concern that its mainstreaming might undermine this very purpose (Gómez-Baggethun et al., 2010; Gómez-Baggethun and Ruiz-Pérez, 2011). As explained by Schulz et al. (2017), criticism around the notion of ecosystem services can be understood in the light of the philosophical debate on the nature of values, i.e. whether something (in this case nature or the environment) has a value for its own sake (i.e. an intrinsic value), autonomously and independently of any other entity (Lockwood, 1999) or whether all values are inherently relational, and ultimately, decided by humans (Morito, 2003). This further leads into the question on whether these values can and should be expressed as exchange values[1] through monetization and whether this leads to commodification (Gómez-Baggethun and Ruiz-Pérez, 2011).

Commodification is defined in this context as "the symbolic and institutional changes through which a good or service that was not previously meant for sale enters the sphere of money and market exchange" (Gómez-Baggethun, 2014; p.67). Gómez-Baggethun and Ruiz-Pérez (2011) explain the way through which the economic framing and conceptualization of nature's value as monetized exchange value can lead to the formalization of property rights on specific ecosystem services or the land producing such services. This appropriation can in turn lead to the creation of institutional structures of sale and exchange in the form of markets; a process of commercialization that is argued to often involve privatization (Boelens et al., 2014; Gómez-Baggethun and Ruiz-Pérez, 2011). Some alert about the spreading of this phenomenon through the growing trade of previously un-marketed ecosystem functions (e.g. carbon sequestration, watershed regulation, habitat provision) in PES schemes, carbon markets and biodiversity off-setting (Luck et al., 2012).

Reasons why commodification is considered problematic include ethical concerns related to the attributed moral superiority of some aspects of nature, i.e. the consideration that some aspects of nature ought to not to be for sale (McCauley, 2006). The debate is partly about expanding the frontier of commodification to previously non-traded ecosystem services, since some other have been commodified for centuries (e.g. food, energy) (Gómez-Baggethun and Ruiz-Pérez, 2011). Commodification has also been argued to act as complexity blinder that obscures the importance of biodiversity to perform ecosystem functions (Norgaard, 2010; Peterson et al., 2010). Equity concerns regarding changes over property rights and access to resources have also been raised, following evidence that the implementation of markets for ecosystem services have led to increased inequalities (Corbera et al., 2007). From a conservationist perspective, there are misgivings that shifting to an economic framing may lead to motivation crowding out in the long term (Luck et al., 2012; Rode et al., 2015) and result in changes in mind-sets relating to environmental protection (Vatn, 2000). It is argued that this risks changing conservation logic "from moral obligation or community norms towards conservation for profit" (Rode et al., 2015, p. 273), undermining ethical and moral arguments for conservation (McCauley, 2006).

This frame shifting has been related to a broader economic process of neoliberalization of nature conservation (Fletcher and Büscher, 2017; Mcafee, 2012; Sandbrook et al., 2013). Valuing ecosystem services and related market environmentalism have been advocated as ways to reconcile economic growth, allocation efficiency and environmental conservation, that some associate with the expansion of neoliberal ideology (Gómez-Baggethun and Ruiz-Pérez, 2011). While its

1 A note is necessary on the issue of intrinsic values with respect to the concept of *existence* values. Conventional environmental economics includes existence values as part of the recognized taxonomy of exchange environmental values composing the so-called total economic value (TEV); i.e. individuals' appreciation of a given environmental good or attribute for its mere existence, even if they do not use it or enjoy it directly. Human motivations which may underlie the position that nature should be conserved *in its own right* have been subject to much debate. In practice, what is at issue here is whether it is meaningful to say that individuals can assign a quantified value to nature or its component parts, reflecting what they consider to be intrinsic value (Turner et al., 2003).

increasingly recognized that most PES schemes do not operate in practice as actual markets (Martin-Ortega et al., 2013; Muradian and Gómez-Baggethun, 2013; Vatn, 2000; Wunder, 2015), the argument is been made that they still reflect a *market logic* or *rhetoric* (Fletcher and Büscher, 2017), with some scholars explicitly arguing that the promotion of PES responds to an agenda of global corporate interests (Büscher, 2012).

Some contend these views. Fletcher and Büscher (2017) provide a good overview of the arguments that have been made to refute or at least nuance commodification in this context. These all share the overarching core idea that payments for ecosystem services do not *have to* require commodification (Hahn et al., 2015). For example, for some authors 'propertization' of ecosystem services does not have to mean privatization, since property rights may still be held collectively (Farely and Costanza, 2010); or that nature valuation does not necessarily need to be orientated to profitability (Muniz and Cruz, 2015). These nuances have led to proposals of 'hybrid' (i.e. not strictly Coasean) formulations of PES that place stronger focus on the integration of equity, justice and ecological sustainability concerns into PES design (Van Hecken et al., 2015). But some have argued that PES are neoliberal *in nature* and that this make them inherently contradictory with these purposes (Fletcher and Büscher, 2017). Others, while acknowledging that valuation of ecosystem services and market-based conservation instruments do no equate to commodification, claim that the institutional context in which they are currently deployed leads them to it (Gómez-Baggethun and Ruiz-Pérez, 2011).

What is clear is that the debate is not closed. Nor is commodification necessarily unidirectional or irreversible (Gómez-Baggethun and Ruiz-Pérez, 2011). In this study, we explore the views of those involved in informing, designing and implementing environmental public policy on the extent to which the adoption of ecosystem services-based approaches can leadto the commodification of nature and what are the associated implications. We would argue that understanding the views of environmental professionals is as least as important as understanding the theoretically-driven viewpoints that so far dominate this debate, since that would give the real mark to whether this is likely, in the long-run, to trigger any fundamental reaction and changes to environmental governance.

3. The application of ecosystem services-based approaches in Mexico: a brief overview

Mexico is one of the main mega-diverse countries of the planet, hosting more than ten percent of global biological diversity (Sarukhan et al., 2015). Almost eighty percent of its forest are managed under community-based tenure (Klooster, 2003). As in other emergent economies, economic growth has rapidly evolved in the last century based on a strong dependency on natural resources, urbanization process, cattle ranching development and agricultural frontier expansion. This has resulted in a severe degradation of ecosystems evidenced in high rates of deforestation, land degradation, loss of biodiversity, aquifers overuse and water and air pollution, all linked to high marginalization and poverty rates that represent a great challenge for policy-making (Figueroa et al., 2016; Muñoz-Piña et al., 2008).

The notion of ecosystem services has gained increasing prominence in Mexican environmental governance discourse and it is now clearly embedded in its environment political discourse (Mesa-Jurado et al., 2018). The notion of ecosystem services has been progressively linked to economic development policies, predominantly on the forest sector (Lara-Pulido et al., 2018; Perez-Verdin et al., 2016). The National Programme of Payments for Environmental Services, launched in 2003 by the National Forest Commission (CONAFOR), is particularly prominent. The programme has been qualified as one of the most complex and largest PES programmes worldwide, combining poverty alleviation and forest conservation goals (Mcafee et al., 2010; Muñoz-Piña et al., 2008).

Mexico's national PES programme has been discussed in the context of the broader neoliberalization agenda. Shapiro-Garza (2013, p. 12) noted that, having received more structural and sectoral adjustment loans from the World Bank than any other country and being subject to the effects of North American Free Trade Agreement, Mexico's embracing of PES would seem coherent with its "truly neoliberalized open market" agenda. Interestingly, the author finds that the original market-based vocation of the programme had not - at the time of her analysis- led to the introduction of market-like mechanisms into policy design or to devolve administration away from the federal state.

Altogether, this draws a suitable complex context in which to explore the extent to which environmental professionals perceive a risk of nature commodification and potential expected implications, providing also a forewarning of what might happen in other countries.

3.1 Sample

We conducted a total of 20 key informant interviews in November 2017. Participants were recruited from and interviewed at the V International Congress of Ecosystem Services in the Neotropics[2] held in the city of Oaxaca, Mexico. Potential interviewees were pre-selected from the delegates list and an email was sent prior to the congress to schedule interviews. Those who did not answer to the email request, were directly approached at the congress. None of the potential participants approached at the congress refused to take part in the survey. Recruiting participants at this forum allowed us direct access to a varied range of environmental professionals at the national level, including policy-makers, practitioners and academics involved in either designing, applying or informing the application of ecosystem services-based approaches.

Table 1 shows the number and type of organization to which the interviewees are affiliated and a brief description of their remit. Like with any other purposive sampling process (Babbie, 2007), there is always a risk that those more strongly opposed to the topic at hand might not have been present at this event, and it is possible that attendees hold a generally positive attitude towards the topic of ecosystem services. Although it should be noted that the interview disclosed from the start that it had a focus on understanding the risks associated with the application of ecosystem services-based approaches. Therefore, those opposed to the approach or those with negative views of it, would not have necessarily felt excluded or inclined to hide their critical views. It would be fair to say, in any case, that our participants are part of Mexican's environmental policy 'establishment' and that minority voices might not have been captured in our study. Being of a qualitative nature, this study is not aimed at providing a representative generalizable description of the views of all environmental professionals, but rather to understand the meaning and reasoning behind the views of those concerned (Babbie, 2007). Moreover, the sampling process purposely tried to recruit influential professionals, since their views are particularly relevant to understand the direction that environmental governance might take into the future. Although academics account for half of the sample, several of them are also environmental policy advisors or hold/have held key political positions in the environmental sector.

[2] www.pecsii.org.

264 *Table 1. Description of interview participants*
265

Interview code	Sector	Name and type of organization	Interviewee role
Acad1	Academic institution	[anonymized]. Public High Education and Research	Senior academic; research specialization in environmental public policy
Acad2	Academic institution	[anonymized]. Public High Education and Research center	Senior academic; research specialization in participatory natural resources management
Acad3	Academic institution	[anonymized]. Private High Education and Research	Senior academic; research specialization in environmental economics
Acad4	Academic institution	INECOL. Research and knowledge transfer centre	Senior academic; research specialization in public policy
Acad5	Academic institution	CORNELL. High Education and Research (abroad)	Senior academic; research specialization in economic instruments for environmental management
Acad6	Academic institution	UAM. Public High Education and Research	Senior academic; research specialization in impact of environmental public policies
Acad7	Academic institution	COLMEX. Public High Education and Research	Senior academic; research specialization in behavioral economics
Acad8	Academic institution	[anonymized]. Public High Education and Research	Senior academic; research specialization in socio-economic effects of environmental governance
Acad9	Academic institution	[anonymized]. Public High Education and Research	Senior academic; consultant and policy advisor. Member of the team designing and implementing the national PES programme
Acad10	Academic institution	[anonymized]. Private High Education and Research	Senior academic; consultant and policy advisor of federal government and international organizations. Member of the team designing and implementing the national PES programme
CSO1	Civil Society Organization	[anonymized]. Management of resources for conservation and sustainable use of biodiversity	Designer of the Matching Funds programme (local PES scheme)

CSO2	Civil Society Organization	FMCN. Private institution focused on financing and promoting projects for the conservation of Mexico's natural heritage	Coordinator of the integrated watershed movement programme "Watersheds and Cities"
CSO3	Civil Society Organization	FMCN. Private institution focused on financing and promoting projects for the conservation of Mexico's natural heritage	Coordination, design and development of conservation projects nationwide
CSO4	Civil Society Organization	NATURA MEXICANA. Non-profit organization for conservation, environmental management and restoration	Implementation of nature conservation public policies; consultant for policy-making
CSO5	Civil Society Organization	[anonymized]. Non-governmental international organization for the protection of nature	Sector Deputy Lead
Gov1	Government sector	CONAFOR. National Forestry Commission	Coordination of financing mechanisms of the national PES programme
Gov2	Government sector	[anonymized]. Ministry of Environment	Division coordinator
Gov3	Intergovernmental organization	IPBES. Intergovernmental body for the assessment of the state of biodiversity and ecosystem services to inform decision-making	Co-Chair
Gov4	Government sector	INECC. Government institute for Ecology and Climate Change (knowledge provision for policy decision-making)	Design of economic instruments for green growth
Gov5	International government sector	GIZ. German federal government agency for the promotion of sustainable development	Principal advisor for financing mechanism EcoValor project.

Names of organizations are anonymized upon requests by the interviewees as per conditions of consent.

3.2 Interview description

We used semi-structure interviews with a set of pre-determined questions but allowing the interviewer to explore particular themes or responses further (Babbie, 2007). The interviewer first introduced herself and informed the interviewee that the research was aimed at understanding how ecosystem services-based approaches are being implemented in Mexico and to study the risks associated with their implementation. A set of preliminary questions were aimed at capturing the

respondent's general understanding of the notion of ecosystem services and related governance instruments.

The next set of questions prompted discussion on opportunities and risks associated with the use of ecosystem services-based approaches. This was aimed at detecting whether the risk of commodification came up spontaneously in respondents' answers. Next, the issue of commodification was explicitly introduced in the conversation. Hahn et al.'s (2015) framework of degrees of commodification was presented and briefly explained. Hahn et al. refer to degrees of commodification as 'the extent to which the value of biodiversity or an ecosystem services has become a tradable commodity' (ibid, p. 76) and propose a framework of six degrees that they use to analyse commodification in terms of policy integration. These degrees range from "no commodification" (degree zero), which includes intrinsic appreciation of ecosystems, in which the rationale for protecting nature is nature itself, including 'indigenous cosmologies' (p.76); followed by varying degrees in which commodification arises under the instrumental framing of nature without valuation but with "new property rights and liabilities which involve measurement" (degree 1), and with valuation (degree 2) (p.76). The third degree involves "deliberate efforts to express or 'demonstrate' the value of nature in monetary terms" (p.76). Degree 4 refers to Pigouvian monetary incentives (e.g. taxes and subsidies) in which the prices signal is used to "internalize externalities and evoke behavioural change but do not create markets" (p.78). Degree 5 refers to market-traded biodiversity offsets and other markets resembling cap-and-trade systems, such as conservation banking (McKenney and Kiesecker, 2010) and user-financed PES (Vatn, 2000; Wunder, 2015). Degree 6 covers financial instruments and what Hahn et al. (Hahn et al., 2015) refer to as "complete commodification". It refers to how the traded commodity is "re-packaged and re-sold as financial instruments (e.g. bonds or derivatives)" (p. 79), i.e. the process by which financial actors invest in units of conserved nature and turn these into financial products which are traded on financial markets. Respondents were asked, in the light of their experience, their opinion on this framework and whether they would relate Mexico's current environmental public policy to any or several of these degrees of commodification.

Respondents were prompted to reflect specifically on whether the notion of ecosystem services has generated changes in the relationship between humans and nature. Respondents were further requested to reflect on the institutional changes that ecosystem services-based approaches might bring to environmental management and conservation.

A final set of questions specifically asked about participants' views on the monetization of the value of ecosystem services. At the end, respondents were encouraged to provide any further comment about the topic of this research and environmental management more broadly.

Interviews lasted from 30 to 90 minutes.

3.3 Analysis

Interview responses were analysed using a structural code system (DeCuir-Gunby et al., 2011) on the following themes: Understandings of nature's value and ecosystem services-based approaches, Problems and risks, Changes in human-nature relationships and Degrees of commodification and policy integration. As new themes emerged during the reading of the responses, new codes were identified and included in the analysis. Once the code system was stable, sub-codes that showed central ideas, patterns, differences or similarities in the data were established. Finally, each code and sub-code was analysed and described in depth. The software package ATLAS.ti version 7.5.4 was used to store, manage, search, and code these data. Interview responses were analysed directly in Spanish by the authors, who are all native speakers. Quotes have been translated into English for the purpose of writing this manuscript.

We checked responses across the three different sectors represented: academic, civil society organizations and government to explore whether convergence and divergence in views could be

attributed to particular sectors. In general, we did not find remarkable differences or clear clustering of the positions within types of organizations, therefore results are not presented by sector.

4. Results and discussion

Our respondents generally adopt an instrumental interpretation of nature's value, emphasizing (either implicitly or explicitly) nature as the support of human well-being and advocating this as a core argument to protect it. This is not to be interpreted as a dismissal of nature's intrinsic values but, in line with its original purpose (Costanza et al., 1997; Gómez-Baggethun et al., 2010; Peterson et al., 2010), our respondents view the notion of ecosystem services as a means to give visibility to the dependency of humans on nature and to consider its intangible aspects. Ecosystem services-based approaches are seen as way of "*promoting the sustainable use of ecosystems*" (CSO2), demystifying the idea that that conservation and development are not compatible and providing arguments to act in favour of conservation. This reflects the advocacy of ecosystem services as a notion that can help reconciling economic development and environmental conservation where purely conservationist arguments have failed (Gómez-Baggethun and Ruiz-Pérez, 2011; Sandbrook et al., 2013), as illustrated by quotes such as:

> "*Economic development is this monster that is destroying the environment... If you speak to a decision maker and say that the forest needs to be preserved for grandchildren or because biodiversity has its own right to exist, that doesn't resonate much, but if you say 'if you cut down the forest, you're increasing by 50% the risk of paying 10 Million Pesos to compensate for flood damages', then they start listening" (Acad4).*

Our respondents see ecosystem services as an integrative concept, appealing to a range of disciplines and sectors (e.g. political, academic, communities, decision-makers, etc.), providing a 'common language' to connect science and policy and one that can help environmental policy. This is in line with some of the academic arguments (Martin-Ortega et al., 2015) and is illustrated by quotes such as::

> "*In the environmental policy arena we have been very ingenuous, very naïve, to believe that we would convince decision-makers with all the data we have on the biological and ecological importance of ecosystems, species, etc. But we don't see big changes with respect to the advancement of the agricultural frontier… if you look around, threats keep being the same, pressures keep being the same and, as long as other sectors don't start speaking the same language as us, or we don't start speaking the same language as those sectors, those pressures won't diminish" (Gov5).*

With this (seemingly positive) starting premise, next we discuss respondents' views on the problems and risks that they perceive from the usage of ecosystem services-based approaches.

4.1 Problems and risks of ecosystem services-based approaches

When prompted to discuss problems and risks of ecosystem services-based approaches, respondents predominantly focused on the impediments and challenges that their implementation is having 'on the ground', rather than on the negative consequences that they might bring (as it was intended in the interview question).

Our respondents acknowledge that the ecosystem services conceptualization has clearly made its way into environmental public policy in Mexico (notably, in the forest sector), as also evidenced by the analysis of Mexico's public policies (Mesa-Jurado et al., 2018). However, they pointed at the fact that while academia, civil society organizations and governmental institutions have been

considering ecosystem services-based approaches for a number of years now, there has been so far little successful translation on the ground. This has also been noted by the literature more generally (Martin-Ortega et al., 2015; Nahlik et al., 2012) and in Mexico specifically (Lara-Pulido et al., 2018; Perez-Verdin et al., 2016). Some respondents wondered if the value of the approach itself might have been overestimated: *"I have the feeling that it is fashionable and it could be overvalued. Can you tell me any successful examples? How many years [of experience] do we have on ecosystem services with national programmes, academics fully engaged, civil organisations [tatatatata[3]] and examples are still like this. So, it hasn't come to make a revolution in terms of impacts'"* (CSO1). This resonates with Silvertown's (Silvertown, 2015) arguments that ecosystem services-based approaches have been 'oversold'.

Several explanations were given to this lack of practical translation. In general, these explanations are in line with what has been proposed already by the literature. The lack of a unified understanding of the concept makes it operationalization difficult (Nahlik et al., 2012). Difficulties and costs of quantifying and monitoring of ecosystem services were also mentioned (Costanza et al., 2017). This relates to the fact that service provision is rather difficult to establish due to the complex non-linear relationships characterising ecosystems functioning (McVittie et al., 2015). This is associated by our respondents to two important risks. Firstly, with the fact that conservation actions might not end up leading to an actual preservation of ecosystem services, in line with concerns expressed by the literature on the lack of consolidated evidence on the environmental effectiveness of PES (Aguiar et al., 2017; Börner et al., 2017; Pattanayak et al., 2010), or as nicely put by one of our interviewees: *"In watersheds we say that the larger the forested land, the lower the water cleaning process because the water runs with better quality, there are less sediments and also better infiltration. But the reality is that this is not always true, reforestation doesn't necessarily lead to more water… and that's were deceptions come, those we were just talking about, they think that by planting trees all will be sorted out but it isn't necessarily like that. But there is no other way, more research is needed, that is what we would need to do"* (CSO2). Secondly, this might lead to un-fulfilled expectations, disappointment and, ultimately, to disengagement from conservation initiatives, as identified by Massarella et al. (2018) and as powerfully expressed by one of our respondents: *"This is not a problem of surface runoff, it is about groundwater and aquifer overexploitation, then it doesn't matter how much you have upstream if you're pumping groundwater. They are deceiving a bit people in that way, and it is like a time bomb because sooner or later people will complain, 'we have been ten years paying this and we have less water available'"* (Acad4).

Respondents also mentioned other impediments for the effective development of environmental policies based on ecosystem services approaches. These included: lack of political will, conflicting objectives between policies, corruption, political bias towards corporate interests and lack of trust and legitimacy of public policies. These are common challenges traditionally attributed to environmental governance more generally (Hempel, 1996). Discrepancy between budgets allocated to subsidizing agricultural development and conservation was a prominent theme in the interviews, highlighted in statements such as *"While SAGARPA or CONAPESCA* [respectively the federal agencies for Agriculture and Livestock and Fishing] *continue to implement these subsidies, which are monumental!, 120 times bigger than the ones in the environmental sector, while we don't achieve that, change will be difficult"* (Gov5). Indeed, an eyeballed analysis of SAGARPA's budget and the joint budget of the national and local PES schemes indicates that the latter hardly amounts to 10% of the former[4].

[3] Onomatopoeic emphasis.

[4] Based on own calculations using published budgets by SAGARPA's and CONAFOR's (Mexico's national forestry commission, in charge of running the national and various reginal PES schemes): http://subsidiosalcampo.org.mx/analiza/presupuesto-sagarpa/, and http://www.conafor.gob.mx/web/apoyos/, respectively. Ratios are: 6.28% in 2011; 9.05% in 2012; (2013 missing); 8.94% in 2014; 14.20% in 2015 and 3.61% in 2016.

Interaction and cooperation between users and providers of ecosystem services is seen as one of the advantages of ecosystem services-based approaches. However, our respondents also consider that the responsibility over nature conservation is still been mostly deferred to local rural communities. This directly relates to ethical considerations regarding distribution of responsibilities, but not as often argued in the literature. The argument has often been framed in the literature around the idea that upstream landowners have pre-existing moral obligations not to compromise the capacity of those downstream to enjoy the ecosystem services (Luck et al., 2012), questioning that they get paid to cease to pollute (Pirard et al., 2010; Waylen and Martin-Ortega, 2018). Here, however, ecosystem services-based compensation mechanisms are seen as aiming to change the behaviour and livelihoods systems of those that are less to blame for the environmental degradation *in general*, as illustrated by this quote: *"Programmes ask a lot from communities and we have received complaints from people that say 'but what do we win with taking care of the forest, with ensuring clean water, with not using pesticides, with not cleaning the coffee beans in the rivers, with [..], if when we go to Oaxaca everything is dirty, full of litter?; So why are we asked so much for the very little we get when they [in cities] have more money and are not asking people to take care of the water, to keep the river clean? Because when it leaves our community, water goes clean'"* (Acad2).

Other equity considerations such as distribution of costs and benefits (Corbera et al., 2007) and franchise equity (Farrell, 2014)) did not come up in our interviewees responses. This is, to a certain extent, surprising considering the emphasis that has been given to targeting marginalized communities and reduction of rural poverty in e.g. the national level PES programme in Mexico (Shapiro-Garza, 2013) and the more general questioning of market-based instruments' ability to improve social equity based on empirical evidence in Latin America (Aguiar et al., 2017). These equity considerations have been mentioned though in a related regional level analysis in the State of Chiapas (Pineda-Vazquez et al., 2018).

4.2 Monetary valuation of ecosystem services and the risk of nature commodification

As explained, when asked about the risks and problems of using ecosystem services-based approaches, respondents focused on the impediments that the applications are having on the ground. Still, eight respondents spontaneously referred to commodification. Out of those eight, two stated to be aware of criticisms but did not share their concerns (Acad1, Acad3). Three clearly expressed explicit concerns about it (GOV3, Acad2, Acad7) and two others mentioned the debate around nature commodification but did not express a position within it (Acad5, CSO5, CSO1).

Those questioning the argument of commodification of nature dismissed it as an ideological position. While they accept that this might be a legitimate position to have, they felt that this debate hampers the generation of 'real' instruments that would allow reducing pressure over ecosystems and biodiversity. In a way, their position is not so much that commodification is not taking place, but that what is important is to develop operational instruments, arguments and regulations in the current (market) setting , embracing (monetary) valuation as one way of doing so: *"[commodification] is more a discussion of a metaphysical nature… Because at the end of the day, the only way that governments have found to establish these types of policies has been grounded on this view of 'pesos' and cents or monetarily. There may be other ways based on the views of the communities, which is entirely different. But the communities' views find many bumps along the road… The question is how much, or for how long, can such a vision prevail in a market context that alienates most of it"* (Acad1). This is in line with what was found by Sandbrook et al. (2013) in their interviews to conservationist internationally with respect to market-based instruments.

In general, monetary valuation is seen by our respondents as a useful means to establish reference values. Several of our respondents find it useful to establish a common language and as an argument for "negotiation" with other sectors which operate under the "capital logic". It is

considered to be useful as a way to capture the attention of decision-makers. Respondents showed a pragmatic view on it, considering that development decisions are taken in monetary terms and that if ecosystem services are not monetized, they will be ignored. Not in all circumstances, respondents thought, the intrinsic value alone is a sufficient argument:

"Decision makers already do valuation, each time they allow a shopping mall where there was a forest, they are doing a cost-benefit analysis, they indicate how many jobs it can generate, how much taxes; and with the forest there are no numbers to compare to, so how can we resolve this situation without providing a value or some sort of value? Acknowledging beforehand that this is always an underestimation of the value" (Acad4).

"'[...] if we're in this [global] logic we need to play like they [policy makers], like a pack of wolves, we shall howl like them" (Acad7).

Furthermore, these respondents see a greater risk in not incorporating the value of ecosystem services in existing markets. Respondents argued that those markets shape development decisions and natural resources use. Traditionally, those decisions have ignored the value of ecosystem services, and, in a way, they see commodification as an opportunity to recognize such values: *"It is interesting, first to ask yourself why it is a risk to assign a value to ecosystem services, I see it differently, I see what has happened in the past and that is that ecosystem services were not incorporated in markets and being markets how money and decisions are usually managed, by not incorporating these values it means that wrong decisions are taking against conservation… …"* (Acad10). This would relate to the argument made by some scholars that commodification does not necessarily mean nullifying the intrinsic value of natural resources, but making it visible (Costanza et al., 2017) and incorporating it in policy making (TEEB, 2010)[5]. Some of our respondents further argue that commodification can benefit those that are taking conservation action, when a 'sense of co-responsibility' is established between those paying for the service and those receiving the payments.

Nevertheless, respondents warned that monetary valuation is not the panacea and that it should not be the only argument for decision-making. This resonates with what the conservationists interviewed by Sandbrook et al.'s (2013) expressed. Our respondents argue it should be used in combination with other instruments and its limitations should be acknowledged. Respondents were actually critical with the way monetary valuation is being done and the way it is being communicated. They consider that often valuation exercises are incomplete, oversimplified and tend to underestimate the value of ecosystem services. Moreover, some respondents see a risk on the underestimation of values, particularly when used for making the case for conservation initiatives face to large development projects or for the establishment of compensating mechanisms. This to some extent relates to Silvertown's (2015) arguments that valuation can actually 'expose' biodiversity and ecosystem services to "the vagaries of the market" (p.645). But, contrary to Silvertown (2015) who rejects valuation, our respondents urged for establishing rules for the implementation of valuation techniques and the communication of results and, while acknowledging its risks, argue that it can still be useful in certain contexts.

Those respondents who expressed concerns about the risk of commodification made reference to its perverse effects for communities: "*it is a very perverse way of using the economic language with the communities. It isn't appropriate and not used in an appropriate way*" (Acad2). One of our

[5]Two examples were mentioned to illustrate the usefulness of monetary valuation for increasing the visibility of the importance of natural protected areas to other sectors: CONANP's ECOVALOR MX project, an initiative that promotes the valuation of ecosystem services in federal protected natural areas in Mexico in the context of preservation of biodiversity and climate change mitigation (www.ecovalor.mx/index.html); and the valuation of the Cruces Nayarit Dam, in the San Pedro-Mezquital basin (https://fmcn.org/wp-content/uploads/2017/11/ImpactValuation_LasCrucesEN_27-11-25.compressed.pdf). According to one of our respondents, the valuation done in this case highlighted that the impact on the ecosystem services would be much larger than the income expected to generate by the dam (CSO3).

519 respondents explicitly linked this to changes in indigenous cosmovisions of nature but referred to
520 the fact that this can lead to changes in attitudes and behaviour "*for the good or for the bad*"
521 (CSO5), opening up possibility that those changes might be positive. Indeed, ecosystem services-
522 based approaches are seen by our respodents to be aimed at, and desired to, change human nature
523 relationships in a way that would lead to further conservation in recognition of the benefits that
524 nature generates.

525 Furthermore, respondents also argued that communities do not necessarily operate anymore
526 under a paradigm of valuing nature for its spiritual and ethical values. They observed that
527 communities have been operating under "*some kind of 'neoliberalization' of the environment*"
528 already for long time (Acad1). This would resonate with the idea that ecosystem services-based
529 approaches are just one more element of a broader process of neoliberalization started before the
530 term was popularized (Gómez-Baggethun and Ruiz-Pérez, 2011). Interestingly though, our
531 respondents seem to think of ecosystem services as the one element of that process that can
532 actually act as a counter-balancing force that can help protect nature: "*The concept of market for*
533 *ecosystem services or payments for ecosystem services is not what is destroying nature nor what is*
534 *going to destroy it. On the contrary, it should be the element that counterbalances or seeks the*
535 *acknowledgement of what has not been paid for, that is the benefits nature provides. The risk is*
536 *already there, in the economy. Therefore the risk is that [nature] is not sufficiently acknowledged in*
537 *the economy*" (Gov1).

538 Furthermore, even those most critical seem to consider that despite the risks, applying ecosystem
539 services-based approaches is necessary, as if it was a "*necessary ev*il" ("*un mal necesario*" as
540 expressed in Spanish). This is well illustrated by this quote: "*Of course, in economic terms everything*
541 *can be monetised, it is a big risk, […] but if you don't reach a politician saying this is the number, this*
542 *is how much it will cost if you don't take preventive measures, […] you have to give them the number*
543 *and not only the amount of service, even though this sounds bad, but also how much it will cost… and*
544 *how much it will cost to not maintain [the service].*" (Acad7). This would reflect the pragmatic stand
545 of environmental professionals also identified by Sandbrook et al. (2013) and Waylen and Martin-
546 Ortega (2018) by which environmental professionals consider that the world's economy already
547 runs like this and there is actually more to lose than to gain from not recognizing ecosystem
548 services.

549 Respondents do worry about the emergence of a 'payment dependency', i.e. that rural
550 communities might become dependent on the payments and that payments become the only
551 motivation for conservation, as suggested by some scholars (Luck et al., 2012; Rode et al., 2015).
552 Other worries concern the fragmentation of communities based on their different approach to the
553 management of the resources.

554 Finally, Gov3 argued that the risk of commodification is only to be associated with a 'narrow' vision
555 on ecosystem services that of ecosystem services instrumental values. She advocated for the new
556 conceptualization proposed by Intergovernmental Science-Policy Platform on Biodiversity and
557 Ecosystem Services (IPBES), that is argued to integrate different knowledge systems regarding
558 human-nature interactions, including indigenous and local perspectives (Pascual et al., 2017). It
559 revolves around the notion of "nature's benefits to people" as a broad category that encompasses
560 ecosystem services which ultimately contribute to "leading a good life", which in turn is
561 understood in a broad sense and that may widely differ across cultures (e.g. living in harmony with
562 Mother Earth) (Pascual et al., 2017). While shifting the focus from exchange values towards
563 relational values, understood as ethical and moral principles that guide 'good' human-nature
564 relationships (Chan et al., 2016), the IPBES framework maintains the original anthropocentric
565 perspective, but emphasizes a less utilitarian philosophy and pluralistic values (Schulz and Martin-
566 ortega, 2018). According to this one respondent, IPBES' framework overcomes the problems of
567 ecosystem services-based approaches by removing the term 'services' and by acknowledging
568 alternative and more holistic views of understanding human-nature relationships. Without

necessarily questioning the concept of ecosystem services itself, other respondents also made suggestions for alternative terms, with possibly less 'ideological weight' in their view. Terms like 'services from nature', 'services from biodiversity', 'nature's rights' or 'right to a health environment' or 'agreements for our water' (instead of PES), were suggested. This is explicitly contradictory with recent criticism made to IPBES, which argues that "by replacing ecosystem services with a near-synonymous term, IPBES ditches the baby (the successful term ecosystem services), whilst keeping the dirty bathwater (the problems with the term)" (Kenter, 2018, p. 40).

Next, we discuss views on the current level of commodification currently perceived to be taking place in Mexican's environmental policy.

4.3 Degrees of commodification and policy integration

When presented with Hahn et al. 's (Hahn et al., 2015) framework of degrees of commodification, three respondents showed clear opposition to it on the basis of its departing premise, i.e. the fact that it assumes that ecosystem services-based approaches *do* lead to commodification, in line with the questioning to the notion of commodification that they had previously expressed (see section 5.2). The rest partially agreed with the framework but suggested modifications to its gradation and alternative categorizations. Moreover, respondents argued that commodification is not something that can be defined a priori but that depends on the context, decisions and views of those involved. Despite these criticisms, the framework was still used by all participants as a boundary object for the discussion on how insofar is commodification present in Mexico's environmental public policy. Table 2 shows examples of instruments and policy arrangements mentioned by the respondents across the various degrees, that we explain next.

There is a generalized sentiment that intrinsic values (degree zero in the framework, e.g. in the form of protected areas) do not drive Mexico's current environmental policy, i.e. they are seen as a theoretical idea but with no practical resonance on the ground. In degree 3, economic valuation is mostly seen to be confined to the academic realm only. Respondents only mentioned a few concrete examples in which it has been translated into policy, although efforts on this area were acknowledged. This is confirmed by the lack of evidence that Pulido-Lara et al. (2018) and Perez-Verdin et al. (2016), who compiled and reviewed ecosystem services valuation studies in Mexico, detected with regard to the impact or influence of these exercises in decision making processes. Similarly, respondents see land planning as largely failing, i.e. it is present "on paper" but it is not being complied with. It has been suggested that valuation of ecosystem services within the context of integrated ecosystem accounts, such as the ones that are being promoted by the project Natural Capital Accounting and Valuation of Ecosystem Services in Mexico, could overcome some of the limitations of PES implementation (Sanchez-Colon, 2017).

Our respondents unequivocally associate most of Mexico's existing PES schemes with degree 4, i.e. Pigouvian type of PES mostly funded by the government (Schomers and Matzdorf, 2013; Vatn, 2000; Wunder, 2015). This includes the aforementioned national PES programme (Programa Nacional de Pago por Servicios Ambientales) developed by CONAFOR. While this programme was originally established in 2003 to introduce market-efficiency into environmental protection, it has essentially become a federal subsidy for poverty alleviation as explained in detail by Shapiro-Garza (2013). This author attributes this lack of further market transition of the national PES programme to a clash with the norms, laws and institutions of the Mexican federal state as well as with the effect that key actors had in shaping its implementation. On the contrary, our respondents seem to associate it with practical impediments, such as the need for a better understanding and monitoring of the ecosystem services provided and their monetary value as well as the need for clarification over property rights and 'rights to sell'.

Other PES schemes were also mentioned. The Local Payments for Environmental Service Mechanisms through Matching Funds (Fondos Concurrentes), implemented since 2008, are a local form of PES, which 'matches' local funds with national funds to transition from nationally to locally

financed programmes (Nava-López et al., 2018). These matching funds are considered to be a 'wise' arrangement by our respondents because they establish a link between users and providers and have enabled communication between different government sectors and investors about the management of the land. This has led, according to our respondents, to a certain relief on CONAFOR's budget. Similar benefits with respect to communication were mentioned about another CONAFOR operated PES scheme, the Biodiversity Heritage Fund (Fondo Patrimonial para la Biodiversidad), which allowed different municipalities to communicate and take decisions based on a 'catchment vision' rather than according to political-administrative boundaries (CSO3). This 'catchment vision' has also been mentioned as one of the values of applying ecosystem services-based approaches more generally (e.g. Martin-Ortega (2012)).

Respondents associate some existing initiatives with degree 5 (e.g. voluntary carbon markets), but signalled that these are isolated experiences and that there is not yet sufficient demand and offer for them. The few local PES schemes that exist are considered to be PES-like/subsidy types (i.e. corresponding to degree 4). In general, it was considered that for this kind of instruments to become more widespread, further changes in the public policy would have to occur. One respondent (CSO3) argued that while some companies have shown interest in adopting international standards for off-setting (such as the ones promoted by the private non-for-profit Mexican Fund for Nature Conservation), these are not being followed with "rigour and professionalism", entailing a risk of miss-use. This respondents argues that, while off-set is meant to be used only when other actions are not possible according to a pre-established mitigation hierarchy (as also described by the literature (Arlidge et al., 2018)), there is a risk that it gets applied directly, before anything else is tried (i.e. not respecting the hierarchy).

A few other initiatives were associated with degree six (complete commodification). These include the Green Bonds promoted by NAFIN (Nacional Financiera-Banca de desarrollo), which has launched bonds to fund wind and hydropower projects and the Forest Carbon Bonds launched by Mexican Stock Exchange to finance climate change. Scolel'te[6] and prospective REDD and REDD+ projects. Again, our respondents consider that these initiatives are, at this stage, anecdotal, isolated experiences or still at the planning stage, not yet spread or consolidated in environmental policy. Interestingly, one respondent (Acad5) commented that CONAFOR had initially attempted to progress towards the generation of financial instruments but its "now turning back to a subsidy approach, rather than a market creation approach".

In line with the previous discussion on the risk of commodification (section 5.2), some respondents did acknowledge that risks increase with increased degrees of commodification, but again insisted that there is a greater risk in Mexico not entering higher degrees of commodification because it might lose opportunities for development." *Yes, there is that criticism, and I think that with increasing degrees of commodification, obviously risks increase, but there is also the risk of not doing it. To not reach a degree of commodification 6 has its own consequences and these can be really serious" (*CSO3).

[6]Interestingly, Scolel'te is a voluntary carbon market (which respondents had place generically in degree 4 of commodification). It has been implemented since 1997 in Chiapas supported by Plan Vivo Foundation and managed by the local civil association "Ambio"; it is considered the first voluntary forest-based carbon offset in the world (Hendrickson and Corbera, 2015; Osborne and Shapiro-Garza, 2018).

658 Table 2. Examples of instruments and policy arrangements in Mexico associated with degrees of
659 commodification as determined by survey respondents

Degree	Definition (Hahn et al. 2015)	Number of times mentioned by survey respondents	Examples and observations made by survey respondents
0	Moral suasion and regulations justified by intrinsic value	4	Examples: Natural Protected Areas (CONANP), Biosphere Reserves, Wild Life General Law Observations: not complied with / does not drive environmental public policy
1	Non-monetary regulations based on instrumental arguments	5	Examples: Management Plans, Wildlife Management Units (UMAs), Natural Protected Areas (CONANP), Endangered species List Observations: not complied with / generates information does translate into environmental public policy
2	Non-monetary regulations based on physical metrics (units of nature)	3	Not present
3	Non-Monetary regulations designed to maximize economic efficiency	4	Example: land planning and economic valuation Observations: land planning not complied with/ no impact; effort is being put into developing valuation studies but with little translation into policy-making (mostly academic)
4	Economic instruments (not traded)	6	Examples: national PES programme, subsidies and taxes Observations: PES has limited presence (mostly in the forest sector)
5	Economic instruments (voluntary marked trade)	4	Example: voluntary carbon markets; Adopt a hectare (Coatepec, Veracruz), voluntary local PES schemes, (planed) Habitat Banks, land purchase for conservation, Mexican Fund for Nature Conservation's carbon off-setting plan Observations: these are anecdotal, isolated experiences or still at the planning stage, not yet spread or consolidated in environmental policy
6	Financial instruments	3	Examples: Green Bonds (NAFIN), (prospective) REDD and REDD+, Scolel'te, Forest Carbon Bonds in Mexican stock market Observations: these are anecdotal, isolated experiences or still at the planning stage, not yet spread or consolidated in environmental policy

660

661

662 ## 5. Conclusions

663 Ecosystem services has established itself as the predominant paradigm for framing environmental
664 research and policy-making. Originally advocated as a means of raising awareness for biodiversity
665 loses by emphasising the benefits that nature provides to society, ecosystem services-based
666 approaches represent an anthropocentric and instrumental conceptualization of human-nature
667 relationships. The ever more rapid popularization of this concept is raising increasing concern
668 about the possibility that it might translate into a fundamental change of those relationships, one
669 that risks converting nature into a tradable commodity, crowding-out non utilitarian motivations
670 for nature conservation. These concerns have been associated with a broader agenda for the
671 neoliberalization of conservation. The present study has placed the focus on understanding the
672 views of environmental professional in this debate. Their views are of critical interest, since they

shape interpretation, uptake and implementation of ecosystem services-based approaches in practice. This is at least as important as understanding the theoretically-driven viewpoints that have so far dominated this debate, since it gives the real mark to whether this is likely, in the long-run, to trigger any fundamental change in environmental governance. This study is goes beyond previous studies expanding the focus beyond market-based instruments, covering ecosystem services-based approaches more broadly. It is also one of the very few empirical studies on ecosystem services and commodification. Using Mexico as an exemplar case of a mega-biodiverse regional leader where the ecosystem services discourse has clearly permeated the environmental discourse, provides insights that are of relevance worldwide.

In-depth interviews to a range of influential national level professionals across government, civil society and academic institutions from the Mexican environmental governance arena has provided with a nuanced but unequivocal picture of the current interpretation of ecosystem services-based approaches. Environmental professionals' views are in line with the original arguments by which ecosystem services and their valuation serve to recognize the value of nature and can be a mean of reconciling economic development with nature conservation. Impediments and limitations of the approach are in line with those having been identified by the literature more broadly and in general there is a sentiment that, while they have clearly entered the discourse, ecosystem services-based approaches have yet not translated into much change in practice.

While their support for ecosystem services-based approaches cannot be qualified as enthusiastic, our results clearly show that mainstream environmental professionals in Mexico support furthering the implementation of this way of conceptualizing human-nature relationships. Results indicate that, while acknowledging risks of nature commodification and changes to local worldviews, environmental professionals consider that there is greater risk is 'missing out' on opportunities to internalize monetary value of ecosystem services in the context of economic growth-oriented development. Negative side-effects are seen as 'necessary evils' to achieve conservation targets. Environmental professionals acknowledge academic discourses most critical to ecosystem services-based approaches but weigh them against other political demands. Results uncover political dilemmas that go beyond practical operational challenges of ecosystem services-based approaches and which might be rooted at a deeper level. Environmental governance and how it plays out in practice (at a particular time and place) is fundamentally determined by the value judgements of all those involved. While our respondents do not represent the full spectrum of views, they do encapsulate the environmental governance 'establishment'. It could be argued that some of them, who currently apply ES-based approaches themselves, form part of what Büscher (2014, p. 79) refers to as the "epistemic circulation" around ecosystem services, i.e. an interpretation of the value of the ES approach that helps legitimate interventions on which they are involved and dependent on.

Whether the new (but not fundamentally different) conceptualization put forward by IPBES ends up having a substantial impact on the global environmental discourse, or whether more critical minority views become mainstream is yet to be seen. In the meanwhile, our results would indicate that any substantial change in the current direction of environmental governance in the short run is more likely to occur due to the disenchantment produced by the lack of impact in practice than of fears of commodification.

Acknowledgments: This research was funded by the Newton Advanced Fellowship Scheme 2015 of the British Academy and the Newton Fund (project: "Applying ecosystem services-based approaches to water resource decision making: studying the risk of nature commodification in Mexico's last free-flowing river" – Usumacinta ROC - Award Reference: AF150190). Authors are grateful to all interviewees and to ECOSUR colleagues and supporting staff, particularly to the staff of the Laboratorio Transdisciplinario para la

722 Sustentabilidad (LATSU). The authors acknowledge the support of the 'Shut up and Write' writing club and
723 the Women's Writing initiative of the Faculty of Environment of the University of Leeds. The interviews and
724 overall research plan was approved by Research Ethics Committee of the University of Leeds.

725

726
727

728 **References**

729 Aguiar, S., Camba Sans, G., Paruelo, J.M., 2017. Instrumentos económicos basados en mercados
730 para la conservación de la biodiversidad y los servicios ecosistémicos en Latinoamérica:
731 ¿panacea o rueda cuadrada? Ecol. austral 27, 146–161.

732 Arlidge, W.N.S., Bull, J.W., Addison, P.F.E., Burgass, M.J., Gianuca, D., Gorham, T.M., Jacob, C.D.S.,
733 Shumway, N., Sinclair, S.P., Watson, J.E.M., Wilcox, C., Milner-Gulland, E.J., 2018. A Global
734 Mitigation Hierarchy for Nature Conservation. Bioscience 68, 336–347.
735 https://doi.org/10.1093/biosci/biy029

736 Babbie, E., 2007. The basics of social research. Wadsworth Publishing.

737 Bateman, I.J., Mace, G.M., Fezzi, C., Atkinson, G., Turner, K., 2011. Economic analysis for ecosystem
738 service assessments. Environ. Resour. Econ. 48, 177–218. https://doi.org/10.1007/s10640-010-
739 9418-x

740 Boelens, R., Hoogesteger, J., Rodriguez De Francisco, J.C., 2014. Commoditizing water territories:
741 The clash between Andean water rights cultures and payment for environmental services
742 policies. Capital. Nature, Social. https://doi.org/10.1080/10455752.2013.876867

743 Börner, J., Baylis, K., Corbera, E., Ezzine-de-Blas, D., Honey-Rosés, J., Persson, U.M., Wunder, S.,
744 2017. The Effectiveness of Payments for Environmental Services. World Dev. 96, 359–374.
745 https://doi.org/10.1016/j.worlddev.2017.03.020

746 Brockington, D., 2011. Ecosystem services and fictitious commodities. Environ. Conserv. 38, 367–
747 369. https://doi.org/10.1017/S0376892911000531

748 Büscher, B., 2014. Selling Success: Constructing Value in Conservation and Development. World
749 Dev. 57, 79–90. https://doi.org/10.1016/j.worlddev.2013.11.014

750 Büscher, B., 2012. Payments for ecosystem services as neoliberal conservation: (Reinterpreting)
751 evidence from the Maloti-Drakensberg, South Africa. Conserv. Soc. 10, 29.
752 https://doi.org/10.4103/0972-4923.92190

753 Chan, K.M.A., Balvanera, P., Benessaiah, K., Chapman, M., Díaz, S., Gómez-Baggethun, E., Gould,
754 R., Hannahs, N., Jax, K., Klain, S., Luck, G.W., Martín-López, B., Muraca, B., Norton, B., Ott, K.,
755 Pascual, U., Satterfield, T., Tadaki, M., Taggart, J., Turner, N., 2016. Opinion: Why protect
756 nature? Rethinking values and the environment. Proc. Natl. Acad. Sci. 113, 1462–1465.
757 https://doi.org/10.1073/pnas.1525002113

758 Corbera, E., Kosoy, N., Martínez Tuna, M., 2007. Equity implications of marketing ecosystem
759 services in protected areas and rural communities: Case studies from Meso-America. Glob.
760 Environ. Chang. 17, 365–380. https://doi.org/10.1016/j.gloenvcha.2006.12.005

761 Costanza, R., D'arge, R., De Groot, R., Farber, S., Monica, G., Hannon, B., Limburg, K., Naeem, S.,
762 O'Neel, R. V., Paruelo, J., Raskin, R.G., Sutton, P., Van Den Belt, M., 1997. The value of the
763 world's ecosystem services and natal capital. Nature 387, 253–260.
764 https://doi.org/doi:10.1038/387253a0

765 Costanza, R., de Groot, R., Braat, L., Kubiszewski, I., Fioramonti, L., Sutton, P., Farber, S., Grasso,
766 M., 2017. Twenty years of ecosystem services: How far have we come and how far do we still
767 need to go? Ecosyst. Serv. 28, 1–16. https://doi.org/10.1016/j.ecoser.2017.09.008

768 Daily, G., 1997. Introduction: What are ecosystem services?, in: Nature's Services: Societal
769 Dependence on Natural Ecosystems. Island Press, Washington DC, pp. 1–10.
770 https://doi.org/10.1023/a:1023307309124

771 De Groot, R.S., Wilson, M.A., Boumans, R.M.J., 2002. A typology for the classification, description
772 and valuation of ecosystem functions, goods and services. Ecol. Econ. 41, 393–408.

https://doi.org/10.1016/S0921-8009(02)00089-7

DeCuir-Gunby, J.T., Marshall, P.L., McCulloch, A.W., 2011. Developing and using a codebook for the analysis of interview data: An example from a professional development research project. Field methods 23, 136–155. https://doi.org/10.1177/1525822X10388468

Engel, S., Pagiola, S., Wunder, S., 2008. Designing payments for environmental services in theory and practice: An overview of the issues. Ecol. Econ. 65, 663–674. https://doi.org/10.1016/J.ECOLECON.2008.03.011

Farely, J., Costanza, R., 2010. Payments for ecosystem services: From local to global. Ecol. Econ. 69, 2060–2068. https://doi.org/10.1016/J.ECOLECON.2010.06.010

Farrell, K.N., 2014. Intellectual mercantilism and franchise equity: A critical study of the ecological political economy of international payments for ecosystem services. Ecol. Econ. 102, 137–146. https://doi.org/10.1016/j.ecolecon.2014.03.014

Figueroa, F., Caro-Borrero, Á., Revollo-Fernández, D., Merino, L., Almeida-Leñero, L., Paré, L., Espinosa, D., Mazari-Hiriart, M., 2016. "I like to conserve the forest, but I also like the cash". Socioeconomic factors influencing the motivation to be engaged in the Mexican Payment for Environmental Services Programme. J. For. Econ. 22, 36–51. https://doi.org/10.1016/j.jfe.2015.11.002

Fletcher, R., Büscher, B., 2017. The PES Conceit: Revisiting the Relationship between Payments for Environmental Services and Neoliberal Conservation. Ecol. Econ. 132, 224–231. https://doi.org/10.1016/j.ecolecon.2016.11.002

Gómez-Baggethun, E., de Groot, R., Lomas, P.L., Montes, C., 2010. The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes. Ecol. Econ. https://doi.org/10.1016/j.ecolecon.2009.11.007

Gómez-Baggethun, E., Ruiz-Pérez, M., 2011. Economic valuation and the commodification of ecosystem services. Prog. Phys. Geogr. 35, 613–628. https://doi.org/10.1177/0309133311421708

Hahn, T., McDermott, C., Ituarte-Lima, C., Schultz, M., Green, T., Tuvendal, M., 2015. Purposes and degrees of commodification: Economic instruments for biodiversity and ecosystem services need not rely on markets or monetary valuation. Ecosyst. Serv. https://doi.org/10.1016/j.ecoser.2015.10.012

Haines-Young, R., Postchin, M., 2010. The links between biodiversity, ecosystem services and human well-being, in: Raffaelli, D., Frid, C. (Eds.), Ecosystem Ecology: A New Synthesis. Cambridge University Press, Cambridge.

Hempel, L.C., 1996. Environemntal Governance: the global challenge. Island Press, Washington DC.

Kenter, J.O., 2018. IPBES: Don't throw out the baby whilst keeping the bathwater; Put people's values central, not nature's contributions. Ecosyst. Serv. 33, 40–43. https://doi.org/10.1016/J.ECOSER.2018.08.002

Klooster, D., 2003. Campesinos and Mexican Forest Policy during the Twentieth Century, Latin American Research Review.

Kosoy, N., Corbera, E., 2010. Payments for ecosystem services as commodity fetishism. Ecol. Econ. 69, 1228–1236. https://doi.org/10.1016/j.ecolecon.2009.11.002

Kumar, P. (editor), 2010. The Economics of Ecosystems and Biodiversity: The Ecological and Economic Foundations. Earthscan, London and Washington. https://doi.org/10.1017/s1355770x11000088

Lara-Pulido, J.A., Guevara-Sanginés, A., Arias Martelo, C., 2018. A meta-analysis of economic

817 valuation of ecosystem services in Mexico. Ecosyst. Serv. 31, 126–141.
818 https://doi.org/10.1016/j.ecoser.2018.02.018

819 Luck, G.W., Chan, K.M.A., Eser, U., Gómez-baggethun, E., Matzdorf, B., Norton, B., Potschin, M.B.,
820 Luck, G.W., Chan, K.A.I.M.A., Eser, U.T.A., Gómez-baggethun, E., Matzdorf, B., Norton, B.,
821 2012. Ethical Considerations in On-Ground Applications of the Ecosystem Services Concept.
822 Bioscience 62, 1020–1029. https://doi.org/10.1525/bio.2012.62.12.4

823 Martin-Ortega, J., 2012. Economic prescriptions and policy applications in the implementation of
824 the European Water Framework Directive. Environ. Sci. Policy 24, 83–91.
825 https://doi.org/10.1016/j.envsci.2012.06.002

826 Martin-Ortega, J., Jorda-Capdevila, D., Glenk, K., Holstead, K.L., 2015. What defines ecosystem
827 services-based approaches?, in: Martin-Ortega, J.., Ferrier, R.C., Gordon, I.., Khan, S. (Eds.),
828 Water Ecosystem Services: A Global Perspective (International Hydrology Series). Cambridge
829 University Press, Cambridge, pp. 3–9. https://doi.org/10.1017/CBO9781316178904.003

830 Martin-Ortega, J., Ojea, E., Roux, C., 2013. Payments for water ecosystem services in Latin America:
831 A literature review and conceptual model. Ecosyst. Serv. 6, 122–132.
832 https://doi.org/10.1016/j.ecoser.2013.09.008

833 Martin-Ortega, J., Waylen, K.A., 2018. PES What a Mess? An Analysis of the Position of
834 Environmental Professionals in the Conceptual Debate on Payments for Ecosystem Services.
835 Ecol. Econ. 154, 218–237. https://doi.org/10.1016/j.ecolecon.2018.08.001

836 Martinez-Alier, J., Munda, G., O'Neill, J., 1998. Weak comparability of values as a foundation for
837 ecological economics. Ecol. Econ. 26, 277–286. https://doi.org/10.1016/S0921-8009(97)00120-1

838 Massarella, K., Sallu, S.M., Ensor, J.E., Marchant, R., 2018. REDD+, hype, hope and disappointment:
839 The dynamics of expectations in conservation and development pilot projects. World Dev.
840 109, 375–385. https://doi.org/10.1016/j.worlddev.2018.05.006

841 Mcafee, K., 2012. The Contradictory Logic of Global Ecosystem Services Markets. Dev. Change 43,
842 105–131. https://doi.org/10.1111/j.1467-7660.2011.01745.x

843 Mcafee, K., Shapiro, E.N., Mcafee, K., Shapiro, E.N., 2010. Payments for Ecosystem Services in
844 Mexico : Nature , Neoliberalism , Social Movements , and the State Payments for Ecosystem
845 Services in Mexico : Nature , Neoliberalism , Social Movements , and the State. Source Ann.
846 Assoc. Am. Geogr. 5608, 37–41.

847 McCauley, D.J., 2006. Selling out on. Nature 443, 27–28. https://doi.org/10.1038/443027a

848 McKenney, B.A., Kiesecker, J.M., 2010. Policy Development for Biodiversity Offsets: A Review of
849 Offset Frameworks. Environ. Manage. 45, 165–176.

850 McVittie, A., Norton, L., Martin-Ortega, J., Siameti, I., Glenk, K., Aalders, I., 2015. Operationalizing
851 an ecosystem services-based approach using Bayesian Belief Networks: An application to
852 riparian buffer strips. Ecol. Econ. 110, 15–27. https://doi.org/10.1016/j.ecolecon.2014.12.004

853 MEA, 2005. Millennium Ecosystem Assessment. Island Press, Washington, DC.

854 Mesa-Jurado, M.A., Pineda, M., Novo, P., Martin-Ortega, J., 2018. ¿Cómo se adopta la noción de
855 servicios ecosistémicos en la política pública en México?, in: Foro de Discusión: Una Mirada
856 Crítica a Los Servicios Ecosistémicos ¿Mercantilización o Conservación de La Naturaleza?
857 Mexico City, Mexico.

858 Morito, B., 2003. Intrinsic value: a modern albatross for the ecological approach. Environ. Values
859 12, 317–336.

860 Muniz, R., Cruz, M.J., 2015. Making nature valuable, not profitable: Are payments for ecosystem

861 services suitable for degrowth? Sustain. 7, 10895–10921. https://doi.org/10.3390/su70810895

862 Muñoz-Piña, C., Guevara, A., Torres, J.M., Braña, J., 2008. Paying for the hydrological services of
863 Mexico's forests: Analysis, negotiations and results. Ecol. Econ. 65, 725–736.
864 https://doi.org/10.1016/J.ECOLECON.2007.07.031

865 Muradian, R., Gómez-Baggethun, E., 2013. The Institutional Dimension of "Market-Based
866 Instruments" for Governing Ecosystem Services: Introduction to the Special Issue. Soc. Nat.
867 Resour. 26, 1113–1121. https://doi.org/10.1080/08941920.2013.829380

868 Nahlik, A.M., Kentula, M.E., Fennessy, M.S., Landers, D.H., 2012. Where is the consensus? A
869 proposed foundation for moving ecosystem service concepts into practice. Ecol. Econ. 77, 27–
870 35. https://doi.org/10.1016/j.ecolecon.2012.01.001

871 Nava-López, M., Selfa, T.L., Cordoba, D., Pischke, E.C., Torrez, D., Ávila-Foucat, S., Halvorsen, K.E.,
872 Maganda, C., 2018. Decentralizing Payments for Hydrological Services Programs in Veracruz,
873 Mexico: Challenges and Implications for Long-term Sustainability. Soc. Nat. Resour. 0, 1–11.
874 https://doi.org/10.1080/08941920.2018.1463420

875 Norgaard, R.B., 2010. Ecosystem services: From eye-opening metaphor to complexity blinder. Ecol.
876 Econ. 69, 1219–1227. https://doi.org/10.1016/J.ECOLECON.2009.11.009

877 Novo, P., Martin-Ortega, J., Mesa-Jurado, A., Ferre, M., Pineda-Velazquez, M., 2018. Can we
878 measure nature commodification? A framed field experiment in the Lacandon jungle, Mexico,
879 in: Research Network on Economic Experiments for the Common Agricultural Policy.

880 Ojea, E., Martin-Ortega, J., Chiabai, A., 2012. Defining and classifying ecosystem services for
881 economic valuation: The case of forest water services. Environ. Sci. Policy 19–20, 1–15.
882 https://doi.org/10.1016/j.envsci.2012.02.002

883 Osborne, T., Shapiro-Garza, E., 2018. Embedding Carbon Markets: Complicating Commodification
884 of Ecosystem Services in Mexico's Forests. Ann. Am. Assoc. Geogr. 108, 88–105.
885 https://doi.org/10.1080/24694452.2017.1343657

886 Pascual, U., Balvanera, P., Díaz, S., Pataki, G., Roth, E., Stenseke, M., Watson, R.T., Başak Dessane,
887 E., Islar, M., Kelemen, E., Maris, V., Quaas, M., Subramanian, S.M., Wittmer, H., Adlan, A., Ahn,
888 S., Al-Hafedh, Y.S., Amankwah, E., Asah, S.T., Berry, P., Bilgin, A., Breslow, S.J., Bullock, C.,
889 Cáceres, D., Daly-Hassen, H., Figueroa, E., Golden, C.D., Gómez-Baggethun, E., González-
890 Jiménez, D., Houdet, J., Keune, H., Kumar, R., Ma, K., May, P.H., Mead, A., O'Farrell, P., Pandit,
891 R., Pengue, W., Pichis-Madruga, R., Popa, F., Preston, S., Pacheco-Balanza, D., Saarikoski, H.,
892 Strassburg, B.B., van den Belt, M., Verma, M., Wickson, F., Yagi, N., 2017. Valuing nature's
893 contributions to people: the IPBES approach. Curr. Opin. Environ. Sustain. 26–27, 7–16.
894 https://doi.org/10.1016/J.COSUST.2016.12.006

895 Pattanayak, S.K., Wunder, S., Ferraro, P.J., 2010. Show me the money: Do payments supply
896 environmental services in developing countries? Rev. Environ. Econ. Policy 4, 254–274.
897 https://doi.org/10.1093/reep/req006

898 Perez-Verdin, G., Sanjurjo-Rivera, E., Galicia, L., Ciro Hernandez-Diaz, J., Hernandez-Trejo, V.,
899 Antonio Marquez-Linares, M., 2016. Economic valuation of ecosystem services in Mexico:
900 Current status and trends. Ecosyst. Serv. 21, 6–19. https://doi.org/10.1016/j.ecoser.2016.07.003

901 Peterson, M.J., Hall, D.M., Feldpausch-Parker, A.M., Peterson, T.R., 2010. Obscuring ecosystem
902 function with application of the ecosystem services concept: Essay. Conserv. Biol. 24, 113–119.
903 https://doi.org/10.1111/j.1523-1739.2009.01305.x

904 Pineda-Vazquez, M., Mesa-Jurado, M.A., Novo, P., Martin-Ortega, J., 2018. El enfoque basado en
905 serivicios ecosistémicos: oportunidades y riesgos percibidos por actores locales, in: Foro de
906 Discusión: Una Mirada Crítica a Los Servicios Ecosistémicos ¿Mercantilización o Conservación

907 de La Naturaleza? Mexico City.

908 Pirard, R., Billé, R., Sembrés, T., 2010. Upscaling Payments for Environmental Services (PES): Critical
909 issues. Trop. Conserv. Sci. 3, 249–261.

910 Porras, I., Grieg-gran, M., Neves, N., 2008. All that glitters: A review of payments for watershed
911 services in developing countries. Natural Resource Issues No 11.

912 Prip, C., 2018. The Convention on Biological Diversity as a legal framework for safeguarding
913 ecosystem services. https://doi.org/10.1016/j.ecoser.2017.02.015

914 Raymond, C.M., Singh, G.G., Benessaiah, K., Bernhardt, J.R., Levine, J., Nelson, H., Turner, N.J.,
915 Norton, B., Tam, J., Chan, K.M.A., 2013. Ecosystem Services and Beyond: Using Multiple
916 Metaphors to Understand Human–Environment Relationships. Bioscience 63, 536–546.
917 https://doi.org/10.1525/bio.2013.63.7.7

918 Rode, J., Gómez-Baggethun, E., Krause, T., 2015. Motivation crowding by economic incentives in
919 conservation policy: A review of the empirical evidence. Ecol. Econ. 117, 270–282.
920 https://doi.org/10.1016/j.ecolecon.2014.11.019

921 Saarikoski, H., Primmer, E., Saarela, S.-R., Antunes, P., Aszalós, R., Baró, F., Berry, P., Blanko, G.G.,
922 Goméz-Baggethun, E., Carvalho, L., Dick, J., Dunford, R., Hanzu, M., Harrison, P.A.,
923 Izakovicova, Z., Kertész, M., Kopperoinen, L., Köhler, B., Langemeyer, J., Lapola, D., Liquete,
924 C., Luque, S., Mederly, P., Niemelä, J., Palomo, I., Pastur, G.M., Peri, P.L., Preda, E., Priess, J.A.,
925 Santos, R., Schleyer, C., Turkelboom, F., Vadineanu, A., Verheyden, W., Vikström, S., Young, J.,
926 2018. Institutional challenges in putting ecosystem service knowledge in practice. Ecosyst.
927 Serv. 29, 579–598. https://doi.org/10.1016/j.ecoser.2017.07.019

928 Sanchez-Colon, S., 2017. Contabilidad del Capital Natural y Servicios Ecosystemicos en Mexico 2017-
929 2020, in: 2nd Forum on Natural Capital Accounting for Better Policy.

930 Sandbrook, C.G., Fisher, J.A., Vira, B., 2013. What do conservationists think about markets?
931 Geoforum 50, 232–240. https://doi.org/10.1016/j.geoforum.2013.09.009

932 Sarukhan, J., Urquiza-Haas, T., Koleff, P., Carabias, J., Dirzo, R., Ezcurra, E., Cerdeira-Estrada, S.,
933 Soberon, J., 2015. Strategic actions to value, conserve, and restore the natural capital of
934 megadi versity countries: The case of Mexico. Bioscience 65, 164–173.
935 https://doi.org/10.1093/biosci/biu195

936 Schomers, S., Matzdorf, B., 2013. Payments for ecosystem services: A review and comparison of
937 developing and industrialized countries. Ecosyst. Serv. 6, 16–30.
938 https://doi.org/10.1016/j.ecoser.2013.01.002

939 Schulz, C., Martin-Ortega, J., Glenk, K., Ioris, A.A.R., 2017. The Value Base of Water Governance: A
940 Multi-Disciplinary Perspective. Ecol. Econ. 131, 241–249.
941 https://doi.org/10.1016/j.ecolecon.2016.09.009

942 Schulz, Martin-ortega, J., 2018. ScienceDirect Quantifying relational values — why not ? Curr. Opin.
943 Environ. Sustain. 35, 15–21. https://doi.org/10.1016/j.cosust.2018.10.015

944 Shapiro-Garza, E., 2013. Contesting the market-based nature of Mexico's national payments for
945 ecosystem services programs: Four sites of articulation and hybridization. Geoforum 46, 5–
946 15. https://doi.org/10.1016/j.geoforum.2012.11.018

947 Silvertown, J., 2015. Have Ecosystem Services Been Oversold? Trends Ecol. Evol.
948 https://doi.org/10.1016/j.tree.2015.08.007

949 Turner, R.K., Paa, J., Cooper, P., Farber, S., Jessamy, V., 2003. Valuing nature : lessons learned and
950 future research directions 46, 493–510. https://doi.org/10.1016/S0921-8009(03)00189-7

951 Van Hecken, G., Bastiaensen, J., Windey, C., 2015. Towards a power-sensitive and socially-informed
952 analysis of payments for ecosystem services (PES): Addressing the gaps in the current debate.
953 Ecol. Econ. 120, 117–125. https://doi.org/10.1016/j.ecolecon.2015.10.012

954 Vatn, A., 2000. The environment as a commodity. Environ. Values 9, 493–509.

955 Waylen, K.A., Martin-Ortega, J., 2018. Surveying views on Payments for Ecosystem Services:
956 Implications for environmental management and research. Ecosyst. Serv. 29, 23–30.
957 https://doi.org/10.1016/J.ECOSER.2017.11.007

958 Wunder, 2005. Payment for environmental services: Some nuts and bolts, CIFOR Occasional paper,
959 42, p 24.

960 Wunder, S., 2015. Revisiting the concept of payments for environmental services. Ecol. Econ. 117,
961 234–243. https://doi.org/10.1016/j.ecolecon.2014.08.016

962